This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

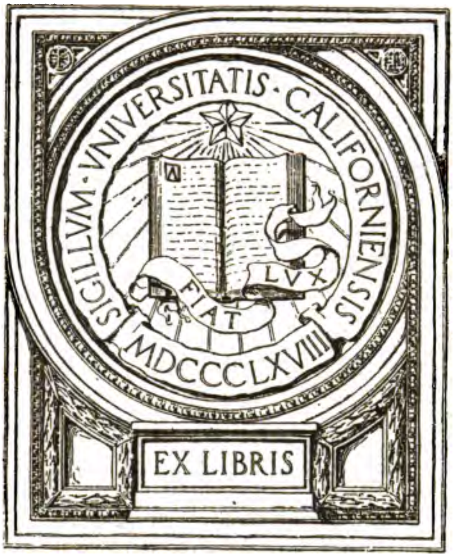
+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

GIFT OF


SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS
FIAT LVX
MDCCCLXVIII
EX LIBRIS

No. 1713

U.S. Ordnance dept.

INSTRUCTIONS FOR MOUNTING USING, AND CARING FOR

6-INCH BARBETTE CARRIAGE

MODEL OF 1910

FOR

6-INCH GUNS

MODEL OF 1908 MII

(*TEN PLATES*)

MAY 29, 1914

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

UF643
A6
6 in B
1917b

L. C.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ORDNANCE,
Washington, May 29, 1914.

This Manual is published for the information and government of the Regular Army and Organized Militia of the United States.

By order of the Secretary of War:

WILLIAM CROZIER,
Brigadier General, Chief of Ordnance.

TABLE OF CONTENTS.

Page.

List of plates 7

General description 9

- Emplacement 9
- The carriage 9
- Principal parts 9
- Pedestal 10
- Pivot yoke 10
- Cradle 10
- Recoil and counterrecoil system 11
- Gunner's platforms 12
- Elevating mechanism 12
- Range disk 12
- Traversing mechanism 13
- Sight 13
- Shield and supports 14
- Gas ejector system 14
- Conduits and wiring 15
- Firing circuit 16
- Lighting circuit 17
- Shot trucks 17

Instructions for assembling the carriage 18

Care of the carriage 21

- General instructions 21
- Oil holes 21
- To pack a stuffing box 22
- Instructions for cleaning recoil cylinders 22
- List of articles packed in armament chest 24
- Names of parts 25

LIST OF PLATES.

Plate No. Drawing No.
I. Platform plate (for casemate emplacement)
II. Platform plate (barbette emplacement) 7–16–1A
III. Right and left side elevations 7–16–2
IV. Plan and rear elevation 7–16–3
V. Cradle 7–16–7
VI. Cradle details 7–16–8
VII. Electrical connections and fittings 7–16–15
VIII. Gas ejector, assembled views 7–16–22
IX. Gas ejector, piping and details 7–16–21
X. Firing circuits 7–16–30

UNIV. OF
CALIFORNIA

INSTRUCTIONS

FOR

Mounting, Using, and Caring for 6-Inch Barbette Carriage, Model of 1910, for 6-inch Gun, Model of 1908 MII.

(TEN PLATES.)

[The parts in *italics* are of particular importance or concern the safety of the carriage and should be specially noted.]

GENERAL DESCRIPTION.

Emplacement.—Emplacements for carriages 1 to 4, inclusive, are casemate emplacements; those for carriages having a serial number higher than 4 are barbette emplacements. In the casemate emplacement the carriage may be traversed through a field of fire of 127°, being limited to this angle by traversing stops bolted to the shield. However, as the sight hole in the shield is about 23 inches to the left of the axis of the gun, the target becomes obscured if the carriage is traversed through an angle of more than 120° from its extreme right position. In the barbette emplacement the field of fire is limited by the construction of the emplacement. The 16 anchor bolts are set in the concrete as the emplacement is constructed, the depressions for the pedestal base and thrust plates being also provided.

The Carriage.—The carriage is of the pedestal mount type, and mounts 6-inch guns, model of 1908 MII. Carriages 1 to 4, inclusive, being mounted in casemate emplacements, are provided with a gas-ejector system and a shield that protects the carriage and personnel from shell or fragments entering the port in the casemate. Carriages above No. 4 are not provided with a gas-ejector system, and have a hooded shield which, together with the concrete parapet in the barbette emplacement, protect the carriage and personnel.

Principal Parts.—The carriage consists of the following principal parts, viz: Pedestal, pivot yoke, cradle, gunner's platforms, traversing and elevating mechanism, shield and shield supports, telescopic sight, firing pistol (or firing magneto), electrical attachments, and (in carriages 1 to 4, inclusive) gas-ejector air valve, piping, and attachments.

Pedestal.—The pedestal is made of cast steel No. 1. In general form it is cylindrical. Approximately the upper 6 inches is reduced in diameter, and to it is screwed the bronze upper sleeve, which forms the pintle for the pivot yoke. To the lower part of the cylinder is screwed the bronze lower sleeve, over which the bottom of the pivot yoke fits with just sufficient clearance to permit of easy traversing. The base of the pedestal is formed by a flange, in which are drilled holes for the 16 foundation bolts and 4 leveling screws. Near the inner circumference of the base is a vertical annular flange, to the top surface of which is screwed the brass azimuth circle. The shoulder near the top of the pedestal provides the lower path for the conical traversing rollers. The outer surface of the annular flange is machined, and forms the seat for the traversing worm wheel. Three drain holes are provided.

Pivot Yoke.—The pivot yoke, of cast steel No. 2, has a cored cylindrical stem from which rise two vertical cheeks. In the latter are trunnion beds for the cradle, which are fitted with dovetailed cap squares bolted to the cheeks. The beds are bronze lined. Finished seats are formed on the outer faces of the cheeks, to which the shield supports are bolted. On the left front of the yoke, near the bottom, is a boss having a finished seat to which the traversing gear bracket is bolted. A seat for the sight bracket is provided on the left cheek just forward of the trunnion bed. A seat for the upper bearing and disk bracket is finished on the right cheek of the yoke in rear of the trunnion bed. A boss formed on the rear of the cylindrical portion of the yoke, below the cheeks, provides a seat for the elevating gear bracket. The two platforms are attached by bolts to seats on the right and left of the yoke. The upper and lower sleeves, roller path, and roller bearings are oiled through oil tubes which are closed by oil plugs. The azimuth pointer is attached to the left side of the yoke by two tap bolts. Elongated bolt holes permit of lateral adjustment of the pointer. The flange ring is bolted to the top of the cylindrical portion of the yoke inside the cheeks. The cover plate is bolted to the flange ring, completely covering the yoke, and providing conduits for the firing and lighting circuits. In carriages 1 to 4, inclusive, the cover plate has holes drilled for the piping of the gas-ejector system.

Cradle.—The cradle, of cast steel No. 2, is bored out and bushed with bronze to receive the gun. Oil grooves formed in the bushings and connected with the 10 oil holes in the cradle insure proper lubrication of the bearing surfaces. Near the front end are trunnions for supporting the cradle and gun in the pivot yoke and on which the cradle and gun rotate when the latter is elevated or depressed. The holes in the trunnions are closed with cover plates. In front of the recoil cylinder a stop on each side limits the elevation to 12° by striking stops on the pivot yoke. Stops on the forward end of the cradle similarly limit the depression to 3°.

On top of the cradle is a ring by which the gun and cradle can be removed from or assembled to the pivot yoke. Underneath the rear portion and forming part of the cradle is the recoil cylinder. Two spring cases are attached by bolts to lugs on the rear of the cradle, and in each is a spring rod, the rear end of which is attached to a yoke secured to the recoil band. The head of each spring rod rests on a pile of two-nested springs in three sections each. Each two springs of the same diameter are separated by a spring separator.

The length of the spring rods should be adjusted so as to return the gun into battery at the maximum angle of elevation without shock, but in no case should the head of the rod protrude out of the front end of the case which is open. The recoil cylinder holds 3 gallons of oil. It has a forged steel No. 3 liner in two pieces, the front head being screwed to the cylindrical portion. Three throttling grooves are cut in the cylindrical portion.

A counter-recoil buffer made of Tobin bronze passes through the front end of the recoil cylinder and is screwed in the front liner head. The rear end of the cylinder is closed with a forged steel No. 2 head, in which are filling and drain holes closed with screw plugs, and the stuffing box with its gland and follower. The stuffing box should be packed with 5 rings of 0.75 inch square Garlock's waterproof hydraulic packing. The piston is forged solid with the piston rod, which is attached by a nut and check nut to the recoil band. The spring yoke rests on the piston rod and is secured between the rear nut and band. On the piston is a bronze No. 4 liner, and in the piston rod there is an axial hole for the counter-recoil buffer.

The gun is not provided with trunnions, but has a feather on its top which fits in a keyway cut in the top of the cradle liner and controls the motion of the gun during recoil. A recoil band is shrunk on and keyed to the gun to which the recoil piston and spring yoke are attached.

RECOIL AND COUNTER-RECOIL SYSTEM.—The action of the gun is as follows: When fired the gun recoils to the rear about 15 inches in the cradle, carrying with it the recoil piston and spring rods, thereby compressing the counter-recoil springs. A small portion of the energy of recoil is taken up in compressing the springs, but the greater portion by the resistance the liquid offers to being forced through the orifices formed by the throttling grooves. The width of the grooves is uniform, but their depth is proportioned so that the areas of the orifices, varying with the position of the piston during recoil, will be such as to give, with the aid of the counter-recoil springs, a constant resistance throughout the length of recoil. The pressure in the cylinder is therefore a uniformly decreasing one. The counter-recoil buffer is tapered so that the escape of the oil during counter-recoil through the varying diametral clearances between the buffer and the walls of its hole will offer such resistance as will control the motion of the gun during its return and finally bring it to rest when the recoil piston reaches the front end of the cylinder.

GUNNERS' PLATFORMS.—On each side of the gun is a platform which is bolted to the pivot yoke and on which the gunner stands when laying the piece.

ELEVATING MECHANISM.—An elevating bracket, bolted to the rear of the pivot yoke, provides bronze bushed beds for the trunnions of the elevating nut. Dovetailed cap squares are bolted to the trunnion beds. The gear case and lower bearing are bolted to the right side of the bracket. The upper bearing is bolted to its seat on the right cheek of the pivot yoke. By means of the elevating handwheel, its shaft, the handwheel shaft gears, the intermediate elevating shaft, the intermediate elevating gears, the elevating nut shaft, the elevating pinion, the elevating gear, the elevating nut, and the outer and inner elevating screws motion is communicated to the cradle. The upper end of the inner elevating screw forms an eye which is hinged between two flanges on the cradle beneath the recoil cylinder by the elevating pin.

To reduce the power required to elevate or depress the gun to a minimum, the cradle trunnions are so located that the center of gravity of the gun (with the projectile and charge in place), cradle, and all parts attached to them lies on the axis of the trunnions; for the same reason the center of gravity of all parts moving in azimuth lies approximately on the vertical axis of rotation of the pivot yoke.

RANGE DISK.—The range disk, consisting of an inner disk and an outer disk of hard brass and a German silver range scale, is assembled to the disk bracket. The bracket is bolted to the right cheek of the yoke, and provides bearings for the gear shaft and disk shaft, on which are assembled the intermediate pinion, intermediate gear, and disk pinion. A spiral spring takes up the back lash in the gears. At the top of the disk bracket is a seat for the pointer base, with elongated bolt holes to permit of lateral adjustment. A tongue on the pointer slides in a groove in the base, and lateral adjustment of the pointer is made by means of a correction screw seating in the pointer base and meshing with teeth machined on the arc of the pointer. A clamping screw secures it in position. A gear segment bolted to the right side of the cradle below the maneuvering ring meshes with the intermediate gear pinion. Any motion of the gun in elevation is communicated through the gear segment, intermediate pinion, intermediate gear, and disk pinion to the range disk. The disk is graduated in intervals of 20 yards. The inner circumference of the disk is graduated for subcaliber ranges and the outer circumference for service ranges. The range scale is graduated after piece is mounted in emplacement from data furnished by the Ordnance Department.

Traversing Mechanism.—The pivot yoke rests and is traversed upon a circle of 36 forged steel No. 2 conical rollers held in proper relative positions by a bronze roller cage. The upper roller path of forged steel fits into the shoulder of the pivot yoke and is held in position on the rollers by a flange on its outer circumference. The lower roller path is machined on the shoulder on the pedestal. The traversing mechanism consists of a traversing gear bracket, with cover plate and oil pan, a handwheel bracket, a handwheel and shaft, the upper traversing gears, the intermediate shaft, the lower traversing gears, the worm shaft, the worm, and two-ball thrust bearings. The bracket is bolted to its seat on the pivot yoke. A bronze bearing for the worm shaft is screwed into its forward end, with a notched head permitting of its being latched in adjustment by the worm-bearing latch, which is secured in the proper notch by a split pin. The other end of the worm shaft is supported in a bronze bushed bearing. The worm is keyed to the worm shaft, and ball thrust bearings on the worm shaft at each end of the worm take up the thrust in traversing. The traversing worm wheel is seated on the outside of the annular vertical flange on the base of the pedestal, with a diametral clearance of 0.005 inch, and is retained in position by a shoulder on the pedestal and the brass azimuth circle secured by 16 countersunk screws to the top of the flange. Beneath the teeth on the worm wheel is a seat for the friction band, made in halves united and attached to a boss on the rear of the pedestal by a stud bolt, thereby preventing rotation of the band with the pivot yoke. The other ends of the halves of the band are joined by a bolt having a helical spring interposed between them and the nut. These nuts should be tightened to produce only sufficient friction between the band and the worm wheel to enable the gun to be traversed without slipping and yet permit slipping in case undue strain is brought on the teeth of the worm wheel. The spring serves to regulate and keep uniform during rotation the pressure of the band on the worm wheel.

The handwheel bracket is bolted to the top of the standard, forming the rear part of the traversing gear bracket. The intermediate shaft is incased in this standard. Bronze bushed bearings are provided in the standard and in the handwheel bracket for the intermediate and handwheel shafts. The handwheel bracket provides a slotted seat for the firing pistol (or firing magneto), and a drilled boss to which the shoulder rest is bolted.

Sight.—A sight bracket is bolted to the left cheek of the pivot yoke. Carriages numbers 1 to 4, inclusive, are equipped with 3-inch telescopic sight, model of 1910, a full description of which is contained in Ordnance Department pamphlet No. 1955–A. Carriages having a serial number higher than 4 are equipped with 3-inch telescopic sight, model of 1912, a full description of which is contained in Ordnance Department pamphlet No. 1959. Two 2-candlepower lamps are provided for illuminating the graduated scales.

SHIELD AND SUPPORTS.—The shield for carriages 1 to 4, inclusive, is cylindrical in shape, the axis being vertical. It is 5.3 inches thick and is pierced with a port for the gun and a sighting hole. The shield is attached to the cheeks of the pivot by two front and two rear shield supports.

The shields for carriages of higher serial numbers than 4 is of special cast steel, approximately semielliptical in shape, and is hooded, the top being an integral part of the shield. The elements of the sides of the shield are vertical, and the hood has an upward slope to the rear. The front of the shield is 5.3 inches thick, tapering from the shoulders to a thickness of 2 inches at the rear. The hood is 1.75 inches thick. The shield is pierced with a port for the gun and a sighting hole. It is attached to the cheeks of the pivot yoke by two front and two rear shield supports.

GAS-EJECTOR SYSTEM.—A gas-ejector system is provided for carriages 1 to 4, inclusive. It consists of a compressed-air tank, furnished by the Engineer Department, an air valve on the breech of the gun with air passages leading into the breech recess, and the necessary piping, flexible tubing, pipe and hose supports, shut-off valve, etc., to connect the tank and the air valve. The tank is furnished and installed by the Engineer Department. From this tank the brass air-supply pipe leads to the air swivel, which is screwed into the stirrup on the flange ring. The air swivel permits of traversing the carriage, which is accomplished by means of a packing box, consisting of the packing-box nut, the gland, and hydraulic packing. An elbow on the air swivel comes up through a hole in left side of the cover plate, flush with its top. The piping is carried from there through a hole in the left cheek of the pivot yoke. Here a shut-off valve is provided for cutting off the compressed air. At this point another elbow and connection carry the pipe to the rear of the left cheek of the yoke, just below the rear shield support, where it is rigidly held by a support. Here connection is made to flexible tubing, which is carried back to the flexible hose support attached to the spring yoke. The breech connecting pipe, secured to the breech, connects the rear end of the flexible hose to the air valve. The valve is attached to the breech of the gun near the top and communicates with an air passage to an annular groove in the breech bushing. From four equidistant points in the circumference of this groove pairs of $\frac{3}{8}$-inch drilled holes communicate with the breech recess, opening into the recess approximately halfway to its forward end.

The principal parts of the valve are the valve body, the valve-body cap, the check valve, the valve spring, the trip plunger, the plunger spring, and the trip lever. The valve body is attached to the face of the breech by four screws. Just below the valve body the cam block is screwed to the block carrier, and on this is pivoted the cam. A cam stop is also driven in the cam block, and the cam is held against this stop by a spiral spring. The check valve is held in its seat in the valve body by the valve spring. The valve stem passes through and extends below the valve body. An annular groove around the stem provides an oil packing to insure air-tightness. Just above this groove there is a second groove into which the trip plunger drops upon, raising the valve stem. The trip plunger lever is pivoted at its center on a lug on the front of the valve body. The lower end is attached to the end of the trip plunger. The trip plunger spring forces the plunger against the valve stem. The action of the valve is as follows: When the block is translated in opening the breech, the cam attached to the cam block on the block carrier pushes up the valve stem, raising the valve from its seat, until the trip plunger drops into the annular groove on the stem. The valve is thus held open until released by pressing on the upper end of the trip lever. Upon closing the breech the rear face of the cam strikes the valve stem, and swings out on its pivot till it passes the stem, when the cam spring causes it to spring back against the cam stop.

Conduits and Wiring.—For carriages Nos. 1 to 4, inclusive, a 3-inch conduit installed by the Engineer Corps carries the lighting and firing leads through a horizontal passage in the platform and a vertical passage in the concrete beneath the pedestal to two clamps on the latter. The leads for the firing and lighting circuits are lead-covered. From the clamps, which are bolted to the front and rear of the inside of the pedestal, near its top, insulated wires having sufficient slack to permit of traversing the carriage are carried to outlets at the front and rear of the cover plate. A ½-inch pipe conduit which screws into a tap in the rear of the cover plate and a ½-inch close nipple screwed into a tap in the front of the cover plate carry the firing and lighting wires, respectively. Flexible insulated wire is provided for the firing leads. The lighting leads pass into a flexible metallic tubing which carries them to a junction box located on the front of the pivot yoke. From this junction box a pipe conduit carries the leads to a junction on the right of the pivot yoke. A vertical pipe carries a branch of the circuit to an Engineer Department plug box on the right cheek of the pivot yoke, from which is plugged the portable lamp furnished by the Engineer Department. Another pipe carries the leads to the lamp for illuminating the range disk.

The junction box on the front of the carriage has another branch which carries the leads in a pipe to a junction box on the left of the carriage, from which a lamp for illuminating the azimuth circle branches off. Another vertical pipe carries the leads to a plug box located just behind the sight bracket; here the sight lamps are plugged in.

The conduits and wiring for carriages No. 5 and higher are similar to those provided for carriages Nos. 1 to 4, inclusive, except that leaded and armored cable is used for the firing circuit, which is led directly from the alternating current firing magneto on the handwheel bracket along the left side of the carriage to the breech.

The FIRING CIRCUIT—*Carriages Nos. 1 to 4, inclusive.*—The firing circuit for these carriages obtains its current from a motor generator connected to the 220-volt mains, which steps the voltage down to 20 volts. One wire coming from the short pipe conduit at the rear of the cover plate is grounded on the pivot yoke; the other leads through the firing pistol, to which it is connected by firing terminals along the left side of the gun to the primer.

The pistol case incloses not only the contacts brought together by the trigger pull, but also a buzzer, enabling the gunner to know that the circuit is completed for firing. Pressing the button over the trigger completes a circuit through a resistance coil and magnet coils of high resistance, these coils being shunted across the trigger contacts. The interrupter and magnet constitute a buzzer. The buzzer current, which is just strong enough to actuate the buzzer hammer, but not strong enough to explode the primer, is kept on for an instant only. The ear should be held close to the buzzer to detect the sound. Pulling the trigger completes the circuit independently of the high-resistance buzzer and permits the passage of sufficient current to fire the piece. Safety against firing before the breechblock is completely rotated is secured by the firing leaf safety stop. This lies in a groove in the top of the gear segment and has two flanges, the inner one of which rides in a circumferential groove in the firing mechanism. When the breechblock is rotated the gear segment carries the firing leaf safety stop with it, causing its outer flange to move behind a projection on the firing leaf and preventing any motion of the latter. The firing mechanism always remains in an upright position because it is rigidly attached to the spindle, which in turn is held by the spindle key and is thus prevented from turning.

Carriages No. 5 and higher numbers.—The firing circuit for these carriages obtains its current from a small hand-operated alternating-current magneto mounted on the handwheel bracket in a manner similar to that described above for the firing pistol on carriages Nos. 1 to 4, inclusive. From the magneto twin conductors, leaded and armored cable, is led to the rear along the left side of the carriage to the breech of the gun. Sufficient slack is provided to compensate for the relative motion of the gun and cradle in elevating and depressing, and during normal recoil. At the breech one lead is grounded directly to the gun and one is connected to the gun portion of the circuit-breaker, which completes the circuit to the primer when the breechblock is rotated home and locked.

LIGHTING CIRCUIT.—This consists of two 8-candlepower lamps, one at the range disk and one at the azimuth pointer, and two 2-candlepower lamps for illuminating the deflection scale and cross wires of the sight. A 16-candlepower 220-volt portable lamp is provided by the Engineer Department for each carriage, with sufficient cable to reach any part of the carriage from the plug box on the right cheek of the yoke. All lights except the portable lamp are controlled by a Russell switch at the junction box on the front of the pivot yoke. The sight lamps may be plugged in or not as desired. All lamps are provided with reflectors so as to illuminate only the parts intended.

SHOT TRUCKS, TYPE 6A.—The projectiles are wheeled to the breech of the gun on shot trucks. Four are furnished with each carriage. The frame of the truck is built up mainly of steel angles riveted. The shot supports are two steel angles running the length of the truck and curved up at their ends to provide stops for the projectiles and attachment of the handle. The truck is supported by four wheels, two in the center of large diameter and on the outside of the truck, and one small one at each end, all of which are rubber tired. It is handled by one man at the handle. The projectiles are placed across the truck on the shot supports, which are of sufficient length to accommodate six projectiles.

INSTRUCTIONS FOR ASSEMBLING THE CARRIAGE.

To Assemble the Carriage.—The following description refers particularly to the order in which the parts are assembled rather than to a complete enumeration of the details of each operation.

In assembling the parts, see that all match figures on parts correspond with each other. All numbers on the bolts should correspond with the numbers alongside of the holes in which they fit.

All machined parts, including the joints, keys, bolts, bolt holes, and working parts, should be thoroughly cleaned (with fine emery cloth if necessary) and oiled before assembling.

On the arrival of a carriage at a fortification, the emplacement will have been prepared for the carriage by the setting of a bed of concrete with the foundation bolts in place. The pedestal with the leveling thrust plates in position is set on the concrete bed with the stamped side to the front, and with the use of the thrust plates and leveling screws is leveled accurately to a sensitive spirit level placed across the finished top of the pedestal, leveling it in all directions. After the pedestal is properly leveled, the foundation bolts are tightened, and it is fixed in place by grouting of neat Portland cement, the leveling screws backed off, and the air-supply pipes placed in position.

The Traversing Worm Wheel, with the friction band on it, is dropped over the lower part of the pedestal so that the hinge stud passes through its hole in the band. The spring bolt nut and friction spring are then assembled. The azimuth scale is secured by screws to its seat on the upper surface of the annular flange on the pedestal. The traversing rollers, 36 in number, are assembled in the roller cage on the lower roller path machined on the shoulder of the pedestal.

The Pivot Yoke is then prepared for being placed over the pedestal by being properly cleaned and all burrs removed. The bearing parts should be well lubricated and the yoke then lowered into position on the pedestal. The upper roller path, being a force fit in the yoke, remains in place.

The Gunners' Platforms are bolted in place and the azimuth pointer bolted to its seat on the left side of the yoke.

The Elevating Gear Bracket is bolted and keyed to its seat on the pivot yoke. The elevating nut and shaft, the inner and outer elevating screws, the elevating gears, and the elevating gear cover are then assembled to the elevating gear bracket. The elevating gear bracket caps are then bolted to the bracket. The lower bearing for the elevating intermediate shaft is then fastened to elevating gear by two bolts. The intermediate elevating shaft nut with one bronze gear is then assembled to lower bracket, the gear meshing with the gear on the elevating nut shaft. The upper bearing is then placed on intermediate shaft and bolted to pivot yoke. The pinion is then assembled to the intermediate elevating shaft. The elevating handwheel shaft, gear, and elevating handwheel are then located in place with gears in mesh. The gear case and cover plate are then bolted in place.

THE TRAVERSING GEAR BRACKET is next bolted to the pivot yoke. The traversing mechanism is then assembled in the bracket.

The air-supply pipe is then fixed in position with pipe support, flange ring and cover plate, air swivel, packing box nut, packing box gland, elbow union, two pieces of hydraulic packing, elbow union plug, lock nut, union plug, swivel, connecting pipe.

The front liner head, with copper gasket, counterrecoil buffer, piston and rod, rear liner head, with copper gasket, and five rings of 0.75-inch square Garlock's waterproof hydraulic packing, one gland, the filling and emptying plugs, and adjusting nut, are assembled on the recoil cylinder. The adjusting nut is screwed on the piston rod to its approximate position. The piston rod is then pushed forward till the piston brings up against the front liner head.

The two spring cylinders are now bolted to the cradle, and in them are assembled the recoil springs, consisting of six outer and six inner springs and four spring separators. The two spring rods with spring rod heads attached are then passed into the spring cylinders from the rear. The recoil springs are then placed in the cylinders and the spring cylinder heads screwed on the spring cylinders. Two spring compressor nuts are then screwed into place on spring rods, passing through holes in the cylinder heads, until bringing up against shoulder on spring rod. When gun is finally balanced there should be approximately 1 inch clearance between spring cylinder head and shoulder on spring compressor nut; the assembled height of the spring is 48.5 inches.

Before placing the cradle on the gun, carefully examine the gun and cradle bearings, removing with emery cloth all rust that may have accumulated or any burrs that may have formed on these surfaces. Lubricate well the bearing surfaces on the gun and cradle. Unless it has been recently examined, the recoil cylinder should be cleaned and the packing examined.

THE CRADLE is now placed on the gun, the piston rod passing through the hole in the recoil band provided for that purpose. The spring rod yoke is assembled to piston and spring rods; the key on the spring rod yoke passes into the recess in the recoil band. Three take-up nuts are then screwed up against the spring yoke, one on the piston rod and one on each spring rod. The gun is now in its approximate position in the cradle. All oil holes should be cleaned and oil plugs put in place. The gear segment is now bolted to the cradle.

THE SHIELDS SUPPORTS, and for the casemate mount the shield strut, as well as the two traversing stops, are bolted to the shield. The shield is then lowered over the pivot yoke till the bolt holes in the supports are opposite the corresponding bolt holes in the yoke. The supports are then bolted to the yoke. The shield strut is now removed to permit of placing the gun and cradle on the yoke, after which it is replaced.

The gun and cradle are now placed on the yoke, the muzzle of the gun passing through the port in the shield, and the trunnion caps bolted in place. The recoil cylinder is filled with hydroline oil, and a projectile and powder charge placed in the gun, in order to balance the gun on the cradle trunnions. This is done by setting up or backing off the nuts on the piston rod and spring rods.

The inner elevating screw is now assembled to the lugs on the cradle by means of the elevating pin.

The disk bracket is bolted to its seat on the pivot yoke, and to it is assembled the range-disk mechanism. Approximately two turns tension should be given to the spiral spring.

The gun is now placed at its maximum elevation, and the gear segment and pinion meshed so that the marks on each correspond.

Assemble the sight bracket to its seat on the left cheek of the pivot yoke and the sight to the bracket.

The firing pistol or firing magneto and shoulder rest and bracket are assembled to the traversing handwheel bracket.

The remainder of the gas ejector system and the electrical connections and fittings can now be assembled.

CARE OF THE CARRIAGE.

General Instruction.—Carriages should be traversed from time to time throughout their entire allowed movement. It is especially important that all parts of the carriage be kept free from rust *at all times.* If rust be allowed to accumulate, its removal from all bearing parts, and especially the piston rod, requires particular attention in order that clearances shall not be unduly increased. The use of sandpaper for this purpose is forbidden, and emery cloth No. 1, being coarse enough for any ordinary rusting, should be used, the rust being softened, if necessary, by kerosene.

If any leakage occurs from the hydraulic recoil system, it should be immediately remedied.

The repacking of stuffing boxes may be done, when necessary, by trained enlisted men under the supervision of an officer.

The copper gaskets between the recoil cylinder liner and its heads should be in good condition, and consequently should be replaced whenever necessary in order to prevent leakage.

Recoil cylinders should be emptied at least every three months and thoroughly cleaned every six months. Experience has indicated that oil should not be removed from the recoil cylinders when carriages are to remain unused for a considerable period, as the walls of the cylinders soon become dry and then rust.

Oil Holes.—Oil holes, where provided, must be cleaned out frequently to keep them free from sand and grit, and *will habitually be kept closed by the oil plugs provided, except when in the act of oiling. Before oiling any hole, wipe off carefully any dirt or grit near the opening that might be carried down into the bearing by the oil.*

All parts where oil holes are provided should be lubricated at frequent intervals whether the carriage be maneuvered or not, and it is essential for the proper preservation and working of the carriage that on every day on which it is maneuvered for any purpose all bearings should be well lubricated immediately before such maneuvering.

When carriages are in use for daily drills, a thorough lubrication twice each week should be sufficient for all but the most severely used parts.

To Pack a Stuffing Box.—To pack a stuffing box, after drawing the oil from the cylinder remove the gland and all the packing in the box. Examine the old packing and discard any unfit for use. If any of the oil packing used, it should be put in after the new.

To repack, put on the piston rod one ring of 0.75-inch Garlock's waterproof hydraulic packing and force it well to the bottom of the stuffing box by a wooden stick and mallet. Treat each layer of packing in a similar manner, being careful to break joints, until five rings of new packing have been inserted, or an equal amount of new and old when any of the latter is used. Screw the gland in the box and set up tight. *No more force than that of one man should be used to tighten up the gland.* The addition of a pipe to the end of the wrench should not be permitted. The gland should be tightened from time to time. If the gland be screwed into the stuffing box too tightly, an unnecessary amount of friction will be produced on the rod. When the gland is screwed in till the flange strikes the box, another ring of packing should be inserted. It is expected that a slight amount of oil will soak through and drip from the boxes of carriages when not in use. This should be caught and not permitted to render the carriages unsightly. Also, when tightening the glands, a slight amount of oil will be squeezed out of the saturated packing.

For further information regarding paints, oils, cleaning materials, and methods of using same, see Ordnance Department pamphlet, Form 1869.

Instructions for Cleaning Recoil Cylinders.—A plumber's hand-force pump is issued by the Ordnance Department to each artillery post for this purpose. The cleaning should be done by enlisted men, under the direction of an officer in the following manner:

Elevate the gun about 10° and remove the oil in the recoil cylinder through drain hole, removing drain, and filling plugs. Then depress gun about 5°, knot a stout cable tightly around the breech of the gun immediately in rear of band, passing the end along the top of the gun and through the eyebolt on top of cradle, and lash it to one of the shield supports, leaving as little slack in cable as possible.

Slowly unscrew the rear nut on each spring rod until the spring compressor nut comes in contact with spring cylinder head, then remove the rear spring rod nuts.

Remove the rear nut from the recoil piston rod and the spring yoke, and remove set screw from front piston rod nut.

Place gun at 5° elevation, release the end of the cable by a small amount, and by pushing on the muzzle move the gun rearward, repeat this operation until the distance between front face of piston rod lug and the rear end of the piston rod is sufficient to permit of the removal of front piston rod nut.

Unscrew the gland about three turns to relieve pressure on packing and move the piston rearward through hole in recoil lug. Unscrew rear liner head, and move head and piston rod to the rear until rear liner head comes in contact with recoil lug.

Thoroughly clean the cylinder with kerosene oil forced into its rear end with the hand pump, then wipe the interior dry with clean cotton waste. The piston rod, piston, and rear liner head should then be cleaned. The counter-recoil buffer will not be removed.

The piston rod and rear liner head should then be moved forward into place, and the front nut assembled on the piston rod, screwing set screw into its seat on piston rod.

Screw the rear liner head into its seat taking care that it is firmly seated. Force piston rod forward until the piston is against the front liner head, then tighten the gland. Place a jack under the breech and remove elevating pin. Depress gun about 1°, assemble elevating pin release jack, and by pushing on the breech the gun moves slowly and gently into the firing position, against the front piston rod nut. Then assemble spring yoke, rear piston rod nut, and two spring rod nuts. The nuts on spring rods should be tighted until there is 1 inch space between shoulder on spring compressor nut and spring cylinder head. Screw the emptying plug into place and fill cylinder with hydroline oil. Allow escape of air, refill, and screw filling plug into place.

List of articles packed in the armament chest for 6-inch gun, model of 1908 MII, and 6-inch barbette carriage, model of 1910.

FOR GUN.

No.	Drawing.	Piece mark.		
*1			Box for firing mechanism.	
3	15-5-47	U47Z	Brushes, cleaning for primer seat (in F. M. box).	
1	15-5-47	U47BC	Cloth, emery, No. 00, 1 quire.	
1	15-5-47	U47AC	Drift, bronze, large.	
1	15-5-47	U47AB	Drift, bronze, small.	
1	15-5-47	U47W	Drill, gunner's.	
3	15-5-47	U47AW	Files, pillar, No. 6........6-inch	For use on bruised breech blocks. No other files to be used thereon.
3	15-5-47	U47AV	Files, three-cornered, No. 4. 5-inch	
3	15-5-47	U47AU	Files, half-round, smooth..8-inch	
3	15-5-47	U47AT	Files, round, smooth......8-inch	
1	15-5-47	U47AR	File, flat, dead smooth....8-inch	
1	15-5-47	U47AS	File, round, second cut...8-inch	
1	15-5-47	U47AU	File, half-round, smooth...8-inch	
1	15-5-47	U47BH	File, three-cornered.......8-inch	
1	15-5-47	U47AM	Hammer, boilermaker's.	
1	15-5-47	U47AG	Hammer, copper.	
*1	15-5-196	U196D	Lanyard, gunner's.	
1	15-5-47	U47AN	Mallet, hand.	
1	15-5-47	U47AP	Mallet, long handle.	
1	15-5-47	U47AQ	Pliers, cutting, tin.	
*1			Pouch, gunner's.	
1	15-5-47	U47T	Punch, gunner's.	
1	15-5-47	U47AF	Punch, pin.	
1	15-5-47	U47AA	Reamer, cleaning, for primer seat (in F. M. box).	
1	15-5-47	U47AE	Scraper, metal.	
*1			Sleeves, gunner's, 1 pair.	
*3	15-5-47	U47AX	Sponges, wagon.	
*4	15-5-47	U47AY	Twine, assorted, 4 balls.	
*10	15-5-47	U47AZ	Waste, cotton, 10 pounds.	
*2	15-5-47	U47BA	Wire, copper, No. 12, 2 pounds.	
*2	15-5-47	U47BB	Wire, copper, No. 16, 2 pounds.	
1	15-5-45	U45G	Wrench, monkey, 12-inch.	
1	15-5-45	U45H	Wrench, monkey, 15-inch.	
1	15-5-44	U44Z	Wrench, tit, for obturator.	
1	15-5-45	U45W	Screw driver, bar, for spindle key.	
			Gear segment screws, etc.	

FOR CARRIAGE.

1	15-5-46	U46Q	Funnel, filling.
1	15-5-46	U46J	Oiler, half-pint.
*1	15-5-46	U46L	Oiler, locomotive, one-quart.
1	15-5-45	U45AN	Screw driver, commercial, 3-inch blade.
1	15-5-45	U45AE	Screw driver, commercial.
1	15-5-44	U44SA	Wrench, box, 5 nut.
1	15-5-43	U43C	Wrench, double, .375 and .5 nuts.
1	15-5-43	U43F	Wrench, double, .625 and .75 nuts.
1	15-5-43	U43G	Wrench, double, .875 and 1 nuts.
1	15-5-43	U43K	Wrench, double, 2 and 1.5 nuts.
1	15-5-43	U43AB	Wrench, single, piston-rod nuts and gland.
1	15-5-43	U43V	Wrench, single, 1.75 nut.
1	15-5-43	U43BB	Wrench, single, 1.375 nut.
1	15-5-43	U43S	Wrench, single, 1.25 nut.
1	15-5-55	U55M	Wrench, spanner, recoil cylinder liner.
1	15-5-44	U44KA	Wrench, spanner, traversing worm bearing.

* Indicates articles carried loose in chest.

Name of Parts of the 6-Inch Barbette Carriage, Model of 1910, Their Piece Marks, Location, and Material of Which They Are Made.

The parts are listed alphabetically under the following headings: Carriage proper; Electrical equipment; Firing pistol; Shot truck; Gas-ejector system.

When referring to a part, always mention its piece mark where given on the list.

Carriages 1, 2, 3, 4, mounted in casemate emplacements, are fitted with gas-ejector system.

Carriages 5 and higher numbers mounted in barbette emplacements are not fitted with the gas-ejector system.

MEANING OF ABBREVIATIONS IN THE COLUMN OF MATERIAL.

A. P	Armor plate.
Br	Brass.
Bz	Bronze.
C. I	Cast iron.
C. S	Cast steel.
C	Copper.
G. I	Galvanized iron.
G. W. H. P	Garlock waterproof hydraulic packing.
G. S	German silver.
H. R. C. W	Habirshaw red core wire.
H. R	Hard rubber.
M. I	Magnet iron.
Mal. I	Malleable iron.
M	Micanite.
P	Porcelain.
R	Rubber.
S	Steel.
S. R	Soft rubber.
S. I	Soft iron.
V. F	Vulcanized fiber.

CARRIAGE PROPER.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
13K2	1	Azimuth pointer	Pivot yoke	Bz.	
13G1	1	Azimuth scale	Fastened to pedestal	Br.	
	20	Balls	Ball thrust bearing	S.	0.5 diameter.
12L1	2	Ball thrust bearings	Worm shaft	S.	2 pieces.
12Y	1	Bolt	Shoulder rest	S.	
9E	2	Bolts	Gear case (9D)	S.	

CARRIAGE PROPER—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
9L	12	Bolts, tap	Platform to pivot yoke	S.	
10L	4	do	Elevating nut cover	S.	
11G	3	do	Handwheel bracket cover	S.	
11D	4	do	Cover plate (11E)	S.	
11N	4	do	Traversing gear bracket oil pan.	S.	
11F	4	do	Traversing gear bracket	S.	
12CA	8	do	Shoulder bracket	S.	
13F	2	do	Azimuth pointer	S.	
4B	4	do	Pedestal for thrust plates	S.	
5D	4	do	Caps to pivot yoke	S.	
6E	36	do	Front shield support to traversing stop.	S.	
6G	28	do	Rear shield support	S.	
9C	2	do	Lower bearing	S.	
9F1	1	Bolt, tap	Gear case (9D)	S.	
9V	3	Bolts, tap	Upper bearing (9T)	S.	
9W	3	do	Upper bearing	S.	
9N	8	do	Elevating gear bracket	S.	
9R	4	do	Elevating gear bracket caps.	S.	
14P	3	do	Disk bracket	S.	Range disk.
14M	3	do	Gear segment	S.	Do.
14Y	2	do	Pointer base	S.	Do.
15R	6	Bolts, tap 0.375	Cover plate (15S)	S.	Carriages 5, 6.
15B	4	Bolts, tap 0.5	Flange ring (15T)	S.	Do.
7K	12	Bolts, special	Cradle	S.	With crown nut (7L).
13C	1	Bolt, spring, with nut.	Friction band	S.	
6B	8	Bolts, special	Strut to shield	S.	Carriages 1, 2, 3, 4.
11A	2	Bolts, with crown nuts	Traversing gear bracket	S.	
14Q	1	Bushing	Disk bracket	Bz.	Range disk.
9A	1	do	Lower bearing (9B)	Bz.	
9H	1	do	Upper bearing (9T)	Bz.	
9J	1	do	do	Bz.	
9S	1	do	do	Bz.	
11B	1	do	Handwheel bracket cover	Bz.	
11C	1	do	Handwheel bracket	Bz.	
11H	1	do	do	Bz.	
11L	1	do	Traversing gear bracket	Bz.	
11P	1	do	do	Bz.	
9X	2	Bushings	Elevating gear bracket	Bz.	In halves.
5C1	2	Caps	On pivot yoke	C. S.	
14U	1	Clamping screw	Pointer base	S.	Range disk.
14T	1	Collar	Disk shaft	S.	Do.
14V	1	Correction screw	Pointer base	S.	Do.
14W	1	Correction screw collar	do	S.	Do.
8A	1	Counter recoil buffer	Cradle	Bz.	
7A	2	Cover plates	Cradle trunnions	S.	
9U	1	Cover plate	Upper bearing (9T)	C. S.	
11E	1	do	Traversing gear bracket	Bz.	
15S	1	do	Flange ring (15T)	S.	Carriages 5, 6.
7N2	1	Cradle	In pivot yoke	C. S.	
7E	1	Cradle liner, front	Cradle	Bz.	
7B1	1	Cradle liner, rear	do	Bz.	
7L	12	Crown nuts	Bolts in spring cylinder	S.	

CARRIAGE PROPER—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
12B	1	Crown nut	Intermediate shaft	S.	0.75.
12E	1	do	Worm shaft	S.	0.75.
12X	1	do	Shoulder rest	S.	1.25.
14B	2	Crown nuts	Disk shaft (14A)	S.	Range disk 1 inch.
14F	1	Crown nut	Gear shaft	S.	1.25.
10B	3	Crown nuts	Elevating shaft	S.	0.75.
7D	1	Crown nut, special	Elevating pin	S.	
14N2	1	Disk bracket	Pivot yoke	C. S.	Range disk.
	1	Disk hub	Range disk	Bz.	
	1	Disk, inner	do	Br.	
	1	Disk, outer	do	Br.	
14S1	1	Disk pinion	On disk shaft	S.	
14A	1	Disk shaft	Disk bracket	S.	Do.
	2	Dowel pins	Handwheel bracket	S.	0.375 by 1.
	1	Dowel pin	Cover plate (11E)	S.	0.187.
9G	4	Drain plugs	Gear case	Bz.	0.625.
10T1	1	Elevating gear	Elevating nut on screw	Bz.	
9M1	1	Elevating gear bracket	Pivot yoke, rear	C. S.	
10D1	1	Elevating gear, handwheel.	Elevating handwheel shaft	Bz.	
10E	1	do	Intermediate elevating shaft.	S.	
9P1	1	Elevating gear bracket cap.	Elevating gear bracket	C. S.	Left.
9Q1	1	do	do	C. S.	Right.
10W	1	Elevating handwheel shaft.	Upper bearing (9T)	F. S.	
10H2	1	Elevating nut	Elevating gear bracket	C. S.	
10K1	1	Elevating nut cover	Elevating nut	C. S.	
10A	1	Elevating nut shaft	Elevating gear bracket	F. S.	
7C	1	Elevating pin	Cradle	Bz.	
10S	1	Elevating pinion	Elevating nut shaft	S.	
10F	1	Elevating pinion, intermediate.	Intermediate elevating shaft.	S.	
10G1	1	do	Elevating nut shaft	Bz.	
10R1	1	Elevating screw, inner	Cradle	S.	
10U	1	Elevating screw, outer.	Elevating nut	Bz.	
10M	1	Elevating shaft, intermediate.	Upper bearing (9T) to lower bearing (9B).	F. S.	
15T	1	Flange ring	Pivot yoke	S.	Carriages 5, 6.
13J	1	Friction band	Traversing worm wheel	S.	In halves.
	3	Gaskets	Recoil cylinder	C.	
9D	1	Gear case	Elevating gear bracket	C. I.	2 pieces.
14L2	1	Gear segment	Cradle	Bz.	Range disk.
14E1	1	Gear shaft	Disk bracket	S.	Do.
8K	1	Gland	Recoil cylinder liner head	Bz.	
12N	1	Handle sleeve	Handwheel	Bz.	
12Q	1	Handle stem	do	S.	
12P	1	Handle washer	do	Bz.	
	8	Handy oilers	Azimuth scale		Commercial.
10V	1	Handwheel	Elevating handwheel shaft	Bz.	
11J	1	Handwheel bracket	Traversing gear bracket	C. I.	
11K	1	Handwheel bracket cover.	Handwheel bracket	C. I.	
12C	1	Handwheel shaft	do	S.	

CARRIAGE PROPER—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
8W	1	Instruction plate......	Cradle, rear, right...........	Bz.	
14K3	1	Intermediate gear.....	Gear shaft (14E1)............	Bz.	Range disk.
14R	1	Intermediate pinion...	Intermediate gear...........	S.	Do.
12A1	1	Intermediate shaft....	Traversing gear bracket.....	S.	Trav. details.
	2	Keys.................	Intermediate gear...........	S.	Range disk.
12F	2	.....do................	Worm shaft.................	S.	
10C	2	.....do................	Elevating nut...............	S.	
12V1	1	Key, gear.............	Traversing gear (12U).......	S.	
9B	1	Lower bearing.........	Elevating gear bracket......	C. S.	
	1	Name plate No. 1.....	Pivot yoke..................	Bz.	
8M	2	Nuts..................	Spring rod..................	F. S.	
8B	1	Nut...................	Piston rod..................	F. S.	
8C	1	.....do................	.....do......................	F. S.	
12BA	2	Nut strips............	Shoulder bracket............	Bz.	
11M	1	Oil pan................	Traversing gear bracket.....	Bz.	
Q3J	36	Oil plugs..............	Pivot yoke, cradle, elevating gear bracket.	Bz.	0.5.
Q3C	15	.....do................	Upper bearing gear case.....	Bz.	0.375.
	8	Oil tubes..............	Pivot yoke..................	Br.	Forced.
	5	Packing rings.........	Recoil cylinder liner head, rear.	G. W. H. P.	
4G3	1	Pedestal...............	Foundations.................	C. S.	
	2	Pins..................	Pointer (14C1)..............	Bz.	0.25 by 0.625.
	1	Pin...................	Spiral spring................	Bz.	
	1	.....do................	Azimuth pointer............	G. S.	0.093.
	2	Pins..................	Bushing (11P)...............	Bz.	0.25 by 1.5.
	2	.....do................	Bushing (11L)...............	Bz.	0.25 by 1,125.
	2	.....do................	Handwheel bracket bushing.	S.	0.25 by 1.25.
	1	Pin...................	Handwheel bracket..........	S.	0.25 by 2.
	2	Pins..................	Bushing (11C)...............	Bz.	0.25 by 0.875.
	2	.....do................	Bushing (11B)...............	Bz.	0.187.
9Y	16	Pins, 0.25 by 0.75......	Bushing (9X)................	Bz.	Driven.
	2	Pins, 0.125 by 0.812....	Bronze bushing (9S).........	Bz.	Do.
	1	Pin, 0.125 by 1.187.....	Bronze bushing (9J).........	Bz.	Do.
	1	Pin, 0.125 by 0.937.....	.....do......................	Bz.	Do.
	2	Pins, 0.125 by 0.75.....	Bronze bushing (9H).........	Bz.	Do.
	2	Pins, 0.125 by 1.062....	Bronze bushing (9A).........	Bz.	Do.
	8	Pins, 0.5 by 1.5........	Sleeve (4E1)................	Bz.	Do.
	6	Pins, 0.75 by 1.75......	Sleeve (4D1)................	Bz.	Do.
8H	1	Piston liner...........	Piston rod..................	Bz.	
8J	1	Piston rod.............	Recoil cylinder.............	S.	
5B3	1	Pivot yoke.............	On pedestal.................	S.	
9K	2	Platforms.............	Pivot yoke..................	C. S.	
8V	4	Plugs.................	Recoil cylinder.............	S.	2 extra.
14C1	1	Pointer................	Pointer base................	Bz.	
14X	1	Pointer base...........	Disk bracket................	Bz.	
14H2	1	Range disk............	Disk shaft (14A)............	....	Parts listed.
	1	Range scale...........	Range disk..................	G. S.	
8G3	1	Recoil cylinder liner...	Cradle......................	F. S.	
8F1	1	Recoil cylinder liner head.	Recoil cylinder.............	S.	Front.
8L1	1	.....do................	.....do......................	S.	Rear.
12M	2	Retaining rings........	Ball thrust bearing..........	C.	

CARRIAGE PROPER—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
	28	Rivets	Liners to cradle	Bz.	
	4	Rivets, countersunk	Spring separator	S.	0.25.
4C1	1	Roller case	Pedestal	Bz.	
5A	1	Roller path	On rollers	S.	
4F	36	Rollers, traversing	Pedestal	S.	
12AA	2	Rubber hose	Shoulder bracket (12Z)	R.	
	2	Screws	Name plate	Br.	0.25 by 0.5.
	1	Screw, 0.25 by 0.875	Pointer base	Bz.	Range disk.
8X	2	Screws	Instruction plate	Bz.	
	20	Screws, countersunk	Trunnion bed liners	Bz.	
13H	16	do	Azimuth scale	Bz.	
14BA	40	Screws, fillister head	Range scale	G. S.	Range disk, 0.164 by 0.21.
14AA	32	do	Range disk hubs	S.	Range disk, 0.312 by 0.21.
8E	1	Set screw	Nut (8B)	S.	
28A1	1	Shield	Shield supports	S.	Carriages 5, 6.
7M	31	Screws	Cover plates to cradle liners.	Bz.	
17A	1	Shield	On shield supports	A. P.	Carriages 1, 2, 3, 4.
6H	1	Shield strut	Shield	S.	Do.
6D1	2	Shield supports, front.	On pivot yoke	S.	Do.
6F1	2	Shield supports, rear	do	S.	Do.
29B	1	Shield support, front	Shield to pivot yoke	S.	5-6, right.
29C	1	do	do	S.	5-6, left.
29D	2	Shield supports, rear	do	S.	Carriages 5, 6.
12Z	2	Shoulder brackets	Shoulder rest	Bz.	
12W	1	Shoulder rest	Handwheel bracket	S.	
10N	1	Sleeve	Handwheel handle	Bz.	
4E1	1	Sleeve, lower	Pedestal	Bz.	
4D1	1	Sleeve, upper	do	Bz.	
	12	Split pins	Bolts in spring cylinder	S.	0.203 by 2.
	1	Split pin	Elevating pin	S.	0.25 by 2.75.
	1	do	Spring nut	S.	0.203.
	1	do	Shoulder rest	S.	0.156.
	1	do	do	S.	0.203.
	1	do	Worm shaft	S.	0.156.
	1	do	Intermediate shaft	S.	
	4	Split pins	Elevating nut cover bolts	S.	0.156 by 1.5.
	3	do	Elevating shaft	S.	Do.
	3	do	Gear case	S.	0.125 by 1.25.
	2	do	Lower bearing (9B)	S.	0.156 by 1.5.
	1	Split pin, 0.093	Disk bracket	S.	Range disk.
	1	Split pin, 0.203	Gear shaft	S.	Do.
	2	Split pins, 0.203	Disk shaft	S.	Do.
8Q	6	Springs, inner	Spring cylinders	S.	
8P	6	Springs, outer	do	S.	
8U2	2	Spring compressor nuts	Spring rods	F. S.	
7J	2	Spring cylinders	Cradle	S.	
8R1	2	Spring cylinder heads.	Spring cylinder	Bz.	
13E	1	Spring, friction	Friction band	S.	
13B	1	Spring nut	do	Bz.	
14J	1	Spring pin	Disk bracket	S.	Do.
8D2	2	Spring rods	Spring cylinder	F. S.	
8N	2	Spring rod heads	Spring rods	F. S.	

CARRIAGE PROPER—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
8T1	4	Spring separators	Spring cylinder	F. S.	
8Z	4	Spring separator liners.	Spring separators	Bz.	
14G1	1	Spring, spiral	Range disk	S.	Range disk.
8S	1	Spring yoke	Spring and piston rods	F. S.	
10P	1	Stem	Handwheel handle	S.	
13L	1	Strip	Azimuth pointer	G. S.	Index marks.
4H	1	Stud, special	Pedestal to brake band	S.	
	1	Taper pin	Elevating shaft, intermediate.	S.	0.162 by 2.375.
	1	.....do	Elevating handwheel shaft	S.	0.162 by 1.812.
	1	.....do	Intermediate shaft	S.	0.208.
	1	.....do	Handwheel shaft	S.	Do.
	1	Taper pin, 0.208	Disk bracket	S.	Range disk.
	1	Taper pin	Pointer base	S.	0.093.
	1	.....do	Correction screw collar	S.	0.135.
4A	4	Thrust plates	Foundations	S.	
12R1	1	Traversing gear, lower.	Worm shaft	Bz.	
12S	1	.....do	Intermediate shaft	S.	
12T1	1	Traversing gear, upper.	Handwheel shaft	Bz.	
12U	1	.....do	Intermediate shaft	Bz.	
11Q	1	Traversing gear bracket	Pivot yoke, left	C. S.	
6K	2	Traversing stops	Shield	S.	
12G	1	Traversing worm	Worm shaft	S.	
13A2	1	Traversing worm wheel	Pedestal	Bz.	
5D	2	Trunnion bed liners	Pivot yoke	Bz.	
9T	1	Upper bearing	.....do	C. S.	Elevating gear parts.
10Q	1	Washer	Handwheel handle	S.	
13D	1	.....do	Friction band bolt	S.	
14Z	1	.....do	Correction screw	S.	
12J	1	Worm bearing	Traversing gear brackets	Bz.	
12D	1	Worm shaft	.....do	F. S.	

ELECTRICAL EQUIPMENT.

	1	Bolt, tap	Strap (T21S)	S.	0.5 by 1.
	4	.....do	Junction box	S.	0.25 by 0.875.
T54AJ	1	.....do	Pipe strap (T54AH)	S.	0.5 by 0.875.
	4	.....do	Hook and plug box	S.	0.5 by 1.25.
	2	.....do	Junction box (T85F)	S.	0.375 by 0.625.
	4	.....do	Junction box (T85N)	S.	0.25 by 0.75.
	1	.....do	Pipe clamp (T85P1)	S.	0.5 by 1.125.
	1	Bolt, tap, washer head.	Firing cable to ground	Bz.	
T55E	3	Bushings	Firing cables	H. R.	
T85S	1	.....do	On elbow (T85Q)	Bz.	
V23AM	1	.....do	Pipe conduit	S.	0.75 by 0.5.
V23AN	1	Bushing, outlet	Pipe conduit (T85J)	....	Krantz Mfg. Co.
T55D	5	Cable thimbles	Firing cables	G. I.	
T85M	1	Cap	Elbow (T85Q)	Bz.	
E13AJ1	2	Candelabra receptacles.	Azimuth pointer and elevating scale.	....	Complete.
E13U	1	Catch washer	Junction box (T85F)	Br.	
	1	Chain	Elbow (T85Q)	Br.	

ELECTRICAL EQUIPMENT—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
T86U	1	Chuck, in halves	Plug connection	Bz.	Lighting circuits.
15U	2	Clamps	Pedestal	V. F.	In halves.
15V	2	do	do	V. F.	Do.
V23AA	2	Couplings, 0.5	Conduits	Mal. I.	Right and left.
V23BA	1	Coupling, 0.75	do	Mal. I.	Do.
T85A	1	Coupling	On steel conduit (T85HA)	Bz.	At cover plate.
T85B	1	do	do	Bz.	At junction box.
T85R	1	do	Junction box (E21T)	Bz.	
T85Q	1	Elbow	Pivot yoke, left side	Bz.	Sight bracket.
T85FA	1	Firing cable, complete.	Pistol to primer	C. wire.	Carriage 1, 2, 3, 4.
T85EA	1	do	Firing cable to pistol	C. wire.	Do.
T85DA	1	Firing cable, grounded.	Pedestal yoke	C. wire.	Do.
T85HA	1	Flexible conduit	From couplings (T85A) and (T85B).	S.	
E13T	1	Fork	Junction box (T85F)	P.	
T85D	1	Gasket	do	S. R.	
	1	Hook	Pivot yoke, right side	Bz.	
T21T	1	Junction box	Left side pivot yoke	C. I.	
T85F	1	do	Pivot yoke, front	Bz.	
T85N	1	do	Right-hand side pivot yoke.	C. I.	
T21K	1	Junction box cover	Junction box (T21T)	C. I.	
T85G	1	do	Junction box (T85F)	Bz.	
T85Z	1	do	Junction box (T85N)	C. I.	
T85H	1	Lamp bracket	Range drum lamp	Bz.	
E20A	1	Lamp and cable, portable.	Pivot yoke, right		Furnished by Engineer Department.
E12NA	2	Lamps, candelabra	Candelabra receptacles		8 c. p., 110 volts.
E9H	2	Lamps, electric	For telescopic sight		2 c. p., 110 volts.
E12Q1	2	Lamp springs	Candelabra receptacles	Bz.	
T85KA	1	Lighting cable	Telescopic sight	No. 14 wire.	
		Lighting circuits	In conduits	H.R.C.W.	
V23LT	1	Nipple, 0.5 close	Pipe conduit	Iron.	
V23TT	1	do	do	Iron.	
E12T1	1	Nut	Range drum lamp	Bz.	For reflector.
T85C	1	do	Conduit at junction box	Bz.	
E12T	1	do	Plug connection	Bz.	
T55F	3	do	Firing cables	Bz.	
T85P1	1	Pipe clamp	Pivot yoke, right-hand side.	S.	
T85J	1	Pipe conduit	Conduits	Mal. I.	0.5
	1	do	From junction box (T85F) to box (T21J1).	Mal. I.	0.5
	1	do	From junction box (T21J1) to box (T85Q).	Mal. I.	0.5
	1	do	From junction box (T85F) to box (T85N).	Mal. I.	0.5
	1	do	From junction box (T85N) to box lamp bracket.	Mal. I.	0.5
	1	do	From box (T85N) to plug box.	Mal. I.	0.75
T85AA	2	do	Plug connection	Bz.	
T55M	3	do	Firing cables	Bz.	
V32A	1	do	Conduit	Mal. I.	0.5 pipe.

ELECTRICAL EQUIPMENT—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
E20B	1	Plug box	Pivot yoke, right		Furnished by Engineer Department.
T85L	1	Plug casing	Plug connection	Bz.	
T85W	1	Plug insulator	Plug	H. R.	
E12P2	1	Reflector	Range disk lamp	Bz.	
T85K	1	.....do	At plug box (T21T)	Br.	
	4	Rivets	Chain to cap and elbows	Br.	
E13V	1	Screw	Junction box (T85F)	Br.	
15W	8	Screws, fillister head	Clamp in pedestal	Bz.	
	4	.....do	Junction box cover (T85G)	S.	0.25 by 0.625.
T85V	1	Separator	Plug connection	H. R.	
T55T	3	Sleeves	Firing cables	Bz.	
T85BA	2	Sockets	Plug connection	Bz.	
T55N	3	.....do	Firing cables	Bz.	
E13AH	2	.....do	Junction box (T85F)	Bz.	
T85X	1	Socket insulator	Plug connection	H. R.	
T21S	1	Strap, pipe	Pivot yoke, left	S.	
T54AH	3	Straps, pipe	Pivot yoke	S.	
E13AC	1	Switch key	Junction box (T85F)	Bz.	
E13R1	1	Switch, russell	.....do		Commercial.
T55U	3	Swivels	Firing cables	Bz.	
T85T	1	Taper sleeve	Plug connection	Bz.	
E12Y	4	Twisted hooks	Right-hand side carriage	S.	For firing cables.
T85E	2	Washers	Junction box (T85F)	S. R.	
T85T	1	Washer	Plug connection	H. R.	
T55V	3	Washers	Firing cables	H. R.	
T55DA	3	Wedges	.....do	Bz.	In halves.

FIRING PISTOL.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
P39D1	1	Binding bolt	In spring insulation	Br.	
P39J	1	Binding post	Buzzer board	Br.	
P39S	2	Binding post cables	Binding bolt and stud to binding post.	H. R. C. W.	
P39W2	2	Binding post screws	Binding post	S.	
P39AB	1	Binding stud	Spring insulation	Br.	
P39F1	2	Bolts, tap	1 magnet header, 1 spiral	Br.	
P39Z2	2	Bushings	In nipples (P50K)	H. R.	
P39AK2	1	Buzzer	Pivoted below magnets		Made up of bushings, vulcanized fiber, 2 steel rivets, 1 brass buzzer handle, 1 brass hammer, 1 armature of magnet iron, 2 brass rivets.
P39AS3	1	Buzzer board	Secured to pistol cover	H. R.	
P39AQ1	2	Buzzer board nuts	Molded in buzzer board	Br.	
P39AP1	2	Buzzer board screws	Pistol cover to buzzer board.	Br.	

FIRING PISTOL—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
P39AC	1	Buzzer frame	Below magnets	Br.	
P39AL1	1	Buzzer frame bolt	Buzzer frame	Br.	
P39V1	1	Buzzer frame screw	do	S.	
P39AH	2	Buzzer pivots	do	S.	
P39AA1	2	Magnet bars	In magnet spools	M. I.	
P39AE	1	Magnet header	Bolted to buzzer board	S. I.	
P39AR	2	Magnet screws	Magnet bars to magnet header.	S.	
P39U3	2	Magnet spools	Rest on buzzer frame	H. R.	
P50K	2	Nipples	Surrounds bushing (P39Z2).	Bz.	
....	1	Pin	For bracket	S.	Driven.
P39[illegible]	2	Pistol bolts	Top of pistol frame	Bz.	
P39A1	1	Pistol cover	To pistol frame	Bz.	
P39C1	1	Pistol frame	Slides on pistol cover	Bz.	
P39AD2	1	Push button	Rear of pistol frame	Br.	
P39AF	1	Push button gland	do	Br.	
P39AG1	1	Push button spring	do	Br.	
P39R1	1	Resistance spool	In buzzer board	H. R.	
P39B2	1	Retaining catch	Riveted to pistol cover	S.	
P39Q	1	Screw, binding	Spiral (P39AJ1)	Br.	
P39Y	2	Screws, contact	In binding post	S.	Platinum tip.
P39T1	2	Screws, header	Magnet header to buzzer	S.	
P39G	2	Screws, spring insulation.	Spring insulation to pistol cover.	Br.	
P39AJ1	1	Spiral	Rear of buzzer board	S.	Platinum contact tip.
P39AM3	1	Spiral screw	Spiral	Br.	
P39AN1	1	Spiral screw nut	Molded in buzzer board	Br.	
P39H4	1	Spring insulation	Lower branch of pistol cover.	H. R.	
P39L3	1	Trigger	Pistol frame	Bz.	Has hard rubber tip secured by pin.
P39M	1	Trigger pivot	In pistol frame	Bz.	
P39K1	1	Trigger spring	Secured to spring insulation.	Br.	Platinized.
P39E2	1	Washer	Binding post	M.	To completely insulate binding bolt.
	....	Wire	Resistance spool	G. S.	
	....	do	Magnet spool	C.	

SHOT TRUCKS, TYPE 6A, FOUR PER CARRIAGE.

A1R	2	Braces, right	Shot-truck frame	S.	Lower.
A1S	2	Braces, left	do	S.	Do.
A1L	2	Braces	do	S.	Upper.
A1E	2	Bushings	Caster wheel	Bz.	
A1B	2	do	Main wheel	Bz.	
A1X	4	Bolts	Main-axle brackets	S.	
A1D	2	Caster wheels	Shot truck	C. S.	
A1F	2	Caster-wheel pins	Caster wheel	S.	
	2	Crown nuts	Axle	S.	
A1T	2	Cross angles	Shot-truck frame	S.	Do.

SHOT TRUCKS, TYPE 6A, FOUR PER CARRIAGE—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
A1U	2	Cross angles	Shot-truck frame	S.	Lower.
A1Q	1	Handle	Shot supports	Wood	
A1A	2	Main wheels	Main axle	C. S.	
A1C1	1	Main-wheel axle	Shot-truck brackets	S.	
A1P	2	Main-axle brackets	Shot-truck frame	C. S.	
	1	Name plate	....do	Bz.	
Q3C	4	Oil plugs	....do	Bz.	
	4	Rivets, round-head	....do	S.	0.5.
	24	Rivets	....do	S.	0.375.
A1W	2	Rubber tires	Caster wheels	R.	
A1V	2	....do	Main wheels	R.	
	2	Split pins	Taper pins	S.	0.093 by 0.5.
	2	....do	Caster pins	S.	0.156 by 1.
	2	....do	Main axle	S.	0.156 by 1.5.
A1G	1	Shot support, right	Shot truck	S.	
A1H	1	Shot support, left	....do	S.	
A1M	1	Stop	Shot supports	S.	
A1N	1	....do	....do	S.	
	2	Screws, round-head	Name plate	Br.	
	2	Taper pins	Main axle	S.	0.279 by 3.125.
A1J	1	Vertical post, right	Shot-truck frame	S.	
A1K	1	Vertical post, left	....do	S.	
	2	Washers	Main axle	S.	

GAS-EJECTOR SYSTEM.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
19G	1	Air swivel	Flange ring (19A)	Bz.	
20C	1	Angle valve, 0.75	Union plug (19K)	Br.	Commercial.
19B	4	Bolts, tap	Flange ring (19A)	S.	0.5.
19D	6	....do	Cover plate (19C)	S.	0.375.
20N	2	....do	Flexible hose support (20M)	S.	0.5.
20K	2	....do	Pipe support (20L)	S.	
20R	2	....do	Pipe support (20S)	S.	0.5.
20H	4	....do	Flexible pipe support (20G)	S.	0.5 by 1.125.
20E	4	Bolts and crown nuts (20F).	Clamp and support (20G)	S.	
21B	2	Bolts and nuts	Pipe support (21A)	S.	
18L	1	Cam	Cam block (18M)	S.	
18M	1	Cam block	Breech of gun	S.	
18A	1	Cam screw	Cam	S.	
18S	1	Cam spring	Cam and block	S.	
18V	1	Cam stop	....do	S.	
18E	1	Check valve	Valve body	S.	
19C	1	Cover plate	Flange ring (19A)	S.	
19A	1	Flange ring	Pivot yoke	S.	
20M	1	Flexible hose support, rear.	Spring yoke (8S)	Bz.	
	1	Flexible metallic tubing.	Connecting breech and valve piping.	C.	
20D	1	Flexible tubing clamp	Flexible tubing support	Bz.	
20G	1	Flexible tubing support.	Cradle, left, rear	Bz.	
19L	1	Lock nut	Union plug (19K)	Bz.	
20S	1	Pipe support	Breech of gun	Bz.	

GAS-EJECTOR SYSTEM—Continued.

Piece mark.	No.	Name of part.	Location.	Material.	Remarks.
20Q	1	Pipe-support clamp	Pipe support (20S)	Bz.	
18J	1	Plunger guide	Valve body (18F)	Bz.	
19H	1	Packing	Air swivel	G. W. H. P.	
19F	1	Packing-box gland	do	Bz.	
19E	1	Packing-box nut	do	Bz.	
19M	1	Pipe	Connecting air swivel	C.	0.75.
20B	1	do	Connecting angle valve	C.	0.75.
20A	1	do	Connecting breech parts	C.	0.75.
21C	1	Pipe, air supply	From swivel to engineer's connection.	Br.	
21E	1	Pipe support	Beneath pedestal	Bz.	
20L	1	do	Pivot yoke, left	Bz.	
21D	1	Pipe-support clamp	Pipe support (21E)	Bz.	
20J	1	do	Pipe support (20L)	Bz.	
21A	2	Pipe supports	Pedestal	S.	
18G	4	Screws, countersunk	Valve body	S.	0.375.
18N	3	Screws, flat-fillister	Cam block	S.	
18Q	4	Screws, valve-body	Valve body	S.	
	4	Split pins	Bolts (20E)	S.	0.093 by 1.
18D	1	Spring, plunger	Valve body	S.	
18B	1	Spring, valve	do	S.	
18K	1	Trip plunger	Valve body (18F)	S.	
18R	1	Trip-plunger pivot pin.	Air valve	S.	
18C	1	Trip lever	Valve body (18F)	Bz.	
18T	1	Trip-lever pivot	Air valve	S.	
18U	1	Trip-lever pivot pin	do	S.	
19K	1	Union plug	Through pivot yoke	Bz.	
19J	1	Union-plug elbow	Air swivel	Bz.	
20T	3	Union nuts	Air pipe	Bz.	
20P	3	Union sleeves	do	Bz.	
18F	1	Valve body	Air valve	Bz.	
18H	1	Valve-body cap	Valve body	Bz.	
19N	1	Washer	Cover plate (19C)	Bz.	

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ORDNANCE,
Washington, May 29, 1914.

Form No. 1713.
Ed. Sept. 1-17—300.
35062/493.

PLATE I

	REVISIONS		
	OCT. 25. 1911. AUG. 19. 1913.		

6 INCH BARBETTE CARRIAGE,
MODEL OF 1910.
PLATFORM PLATE.
(FOR CASEMATE EMPLACEMENT)

FEB. 8, 1911.

SUBMITTED:
Hillman
CAPT. ORDNANCE DEPARTMENT, U.S.A.

EXAMINED:
J. A. Rice
MAJOR ORDNANCE DEPARTMENT, U.S.A.

APPROVED:
Jno. T. Thompson
LT. COL. ORD. DEPT. ACTING CHIEF OF ORDNANCE

CLASS 7	DIVISION 16	DRAWING 1	FILE

YC

Gaylord Bros.
Makers
Syracuse, N. Y.
PAT. JAN. 21, 1908

266827
U.S.

UF643
A6
[illegible]
UNIVERSITY OF CALIFORNIA LIBRARY
1917 b